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(71) Applicant: **Electrolux Home Products Corporation N.V.**
1130 Brussel (BE)

(72) Inventors:
- **Dal Ben, Diego**
  33080 Porcia (PN) (IT)
- **Ros, Paolo**
  33080 Porcia (PN) (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) **Home laundry drier**

(57) Home laundry drier (1) comprising an outer casing (2) provided with a lower base or socle (2s) structured for resting on the floor (G) and, inside the casing, a heat-pump assembly (11) having a refrigerant compressing device (15) which is connected to a bottom wall or bottom portion (2b) of said casing (2) via one or more vibration dumpers (17) structured for floatingly supporting the refrigerant compressing device (15) at a given distance from said bottom wall or portion (2b) during working of the refrigerant compressing device (15); the home laundry drier (1) also comprising manually-removable anchoring means (23) which are located at least partly outside the casing (2), and are structured for selectively engaging both the bottom wall or bottom portion (2b) of the casing (2) and the outer housing (18, 19) of the refrigerant compressing device (15) for substantially preventing the floating movement of the refrigerant compressing device (15); said anchoring means (23) having an end portion (23a) which is located outside the outer casing (2), and is shaped/dimensioned so as to jut out downwards beyond the lower base or socle (2s) of the casing (2) so to prevent said casing (2) from resting on the floor (G) in a correct upright position.

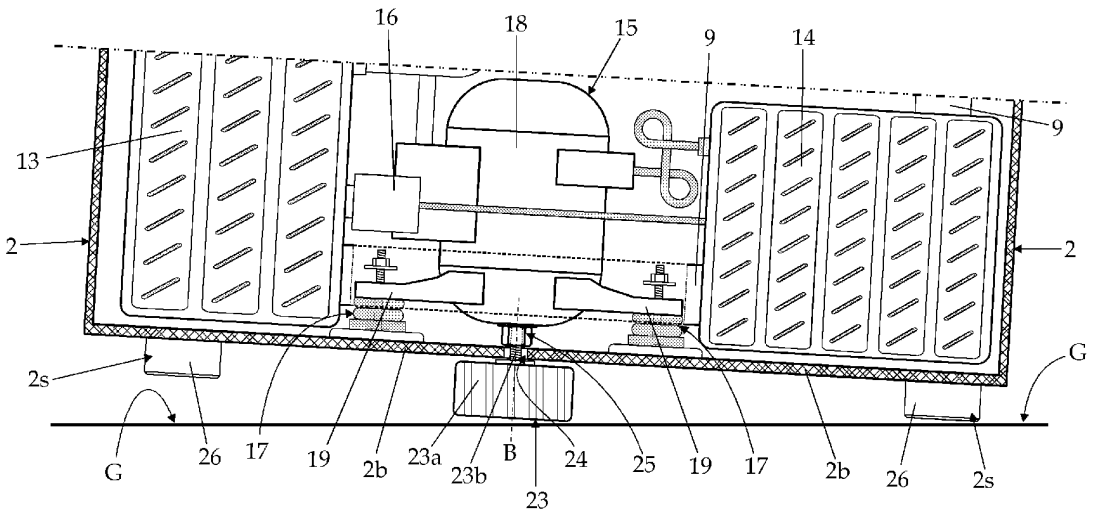

Fig. 6

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Description

[0001] The present invention relates to a home laundry drier.

[0002] In particular, the present invention relates to a rotary-drum, heat-pump type, home laundry drier, to which the following description refers purely by way of example without implying any loss of generality.

[0003] As is known, today's rotary-drum home laundry dryers generally comprise: a substantially parallelepiped-shaped outer boxlike casing structured for resting on the floor; a substantially cylindrical revolving drum structured for housing the laundry to be dried, and which is housed in axially rotating manner inside the casing to rotate about its horizontally-oriented longitudinal axis, directly facing a laundry loading/unloading opening formed in the front wall of the casing; a porthole door hinged to the front wall of the casing to rotate to and from a closing position in which the door rests completely against the front wall of the casing to close the laundry loading/ unloading opening and airtight seal the revolving drum; and an electric motor assembly structured for driving into rotation the revolving drum about its longitudinal axis inside the casing.

[0004] Rotary-drum home laundry driers of the above type are also provided with a closed-circuit, hot-air generator which is structured to circulate inside the revolving drum a stream of hot air having a low moisture content, and which flows through the revolving drum and over the laundry inside the drum to rapidly dry the laundry; and with an electronic central control unit which controls both the motor assembly and the hot-air generator to perform one of the user-selectable drying cycles stored in the same central control unit.

[0005] In today's high-end rotary-drum home laundry dryers, the hot-air generator is usually a closed-circuit, heat-pump type, hot-air generator that comprises: an air recirculating conduit having its two ends fluidly connected to the revolving drum, on opposite sides of the latter; an electric centrifugal fan located along the air recirculating conduit to produce, inside the latter, an airflow which flows through the revolving drum; and finally a heat-pump assembly having its two heat exchangers located one after the other, along the air recirculating conduit.

[0006] More specifically, the heat-pump assembly comprises a first air/refrigerant heat exchanger which provides for rapidly cooling the airflow arriving from the revolving drum to condense and restrain the surplus moisture in the airflow; a second air/refrigerant heat exchanger which provides for rapidly heating the airflow arriving from the first heat exchanger and directed back to the revolving drum, so that the airflow re-entering into the revolving drum is heated rapidly to a temperature higher than or equal to that of the air flowing out of the revolving drum; and an electric refrigerant compressing device which is interposed between the refrigerant-outlet of the first heat exchanger and the refrigerant-inlet of the second heat exchanger, and which compresses the gaseous refrigerant directed towards the second heat exchanger so that refrigerant pressure and temperature are much higher at the inlet of the second heat exchanger than at the outlet of the first heat exchanger.

[0007] To reduce appliance noise and vibrations, in today's heat-pump type, home laundry driers the refrigerant compressing device is firmly anchored to the appliance casing by means of a number of vibration dumpers structured for floatingly supporting the refrigerant compressing device at a given distance from the bottom of the appliance casing.

[0008] In particular, the end of each leg of the electric refrigerant compressing device is firmly fitted/mortised onto the top end of a vertically-oriented, substantially cylindrical, hollow pad of given height, whose lower base is stably rigidly anchored to the bottom of the casing. The cylindrical pad is made of an elastomeric material so to be elastically deformable and thus being able to floatingly support the leg of the electric refrigerant compressing device at a give distance from the bottom of the appliance casing.

[0009] Since the floating connection between the electric refrigerant compressing device and the appliance casing may cause, during appliance handling/transportation, serious damages to the refrigerant compressing device and/or the walls of the outer boxlike casing, mechanical retaining means are known to selectively rigidly connect the outer housing of the refrigerant compressing device to the bottom of the appliance casing.

[0010] Despite being very efficient and relatively inexpensive, the use of these mechanical retaining means is however quite complicated with all problems concerned.

[0011] Aim of the present invention is therefore to provide a home laundry drier featuring a more user-friendly and safety system for temporarily fixing in a rigid and stable, but easy releasable manner, the outer housing of the electric refrigerant compressing device to the bottom of the appliance casing.

[0012] In compliance with the above aims, according to the present invention there is provided a home laundry drier comprising an outer casing provided with a lower base or socle structured for resting on the floor and, inside the casing, a heat-pump assembly having a refrigerant compressing device which is connected to a bottom wall or bottom portion of said casing via one or more vibration dumpers structured for floatingly supporting the refrigerant compressing device; wherein the home laundry drier comprises manually-removable anchoring means which are located at least partly outside the outer casing, and are structured for engaging the refrigerant compressing device to substantially prevent the floating movement of the refrigerant compressing device; said anchoring means having an end portion which is located outside the outer casing, and is shaped/ dimensioned so as to jut out downwards beyond the lower base or socle of the casing so to prevent said casing from resting on the floor in a correct upright position.

[0013] Preferably, the home laundry drier is further-

more characterized in that said manually-removable anchoring means comprises: a head which is dimensioned to remain restrained outside the outer casing, and is shaped/dimensioned so as to jut out downwards beyond the lower base or socle of the casing so to prevent said casing from resting on the floor in said correct upright position; and a stem adapted to engage a corresponding complementary screw portion provided on the refrigerant compressing device.

[0014] Preferably, the home laundry drier is furthermore characterized in that said manually-removable anchoring means comprises a manually-removable anchoring screw member which is structured to engage a corresponding pass-through hole or opening formed on the bottom wall or bottom portion of the casing and to engage the refrigerant compressing device to rigidly connect the refrigerant compressing device to the bottom wall or bottom portion of casing and/or to pull the refrigerant compressing device towards the bottom wall or bottom portion of the outer casing so as to deeply compress said one or more vibration dumpers thereby bringing close to zero the floating movement of refrigerant compressing device.

[0015] Preferably, though not necessarily, the home laundry drier is furthermore characterized in that said manually-removable anchoring means comprise a manually-removable anchoring screw member which is structured so to engage a corresponding pass-through hole or opening formed on the bottom wall or bottom portion of the casing for reaching the refrigerant compressing device, and so to screw onto the outer housing of the refrigerant compressing device so to rigidly connect the refrigerant compressing device to the bottom wall or bottom portion of casing.

[0016] Preferably, though not necessarily, the home laundry drier is furthermore characterized in that said manually-removable anchoring screw member comprises: a head which is dimensioned to remain restrained outside the boxlike casing, and is shaped/dimensioned so as to jut out downwards beyond the lower base or socle of the casing so to prevent said casing from resting on the floor in said correct upright position; and a stem which protrudes into the casing through said pass-through hole or opening formed on the bottom wall or bottom portion of the casing, and which extends towards the refrigerant compressing device up to reach and screw into a corresponding complementary screw portion present on the outer housing of the refrigerant compressing device.

[0017] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said pass-through hole or opening is a pass-through opening which is shaped/dimensioned so as to allow free entrance of the stem inside the outer casing.

[0018] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the stem of said anchoring screw member and the complementary screw portion on the outer housing of the refrigerant compressing device are dimensioned so as to pull and keep the outer housing of the refrigerant compressing device in abutment on the bottom wall of the casing.

[0019] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the stem of said anchoring screw member and the complementary screw portion on the outer housing of the refrigerant compressing device are dimensioned so as to pull the outer housing of the refrigerant compressing device towards the bottom wall or bottom portion of the casing up to deeply compress said one or more vibration dumpers for bringing close to zero their floating support to the refrigerant compressing device.

[0020] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said pass-through hole or opening is an internally threaded pass-through hole, and the stem of the anchoring screw member is properly shaped/dimensioned to screw into both said internally threaded pass-through hole and into the complementary screw portion on the outer housing of the refrigerant compressing device.

[0021] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the outer housing of the refrigerant compressing device comprises a main casing and a number of supporting legs each sticking out from the bottom portion of the main casing, and the distal end of each supporting leg is anchored to the bottom wall or bottom portion of the casing via a corresponding vibration dumper.

[0022] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the complementary screw portion is located on the bottom of the main casing of the refrigerant compressing device.

[0023] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that at least one of said one or more vibration dumpers comprises an elastically-deformable oblong pad that has the lower end rigidly fixed to the bottom wall or bottom portion of the casing, and extends upwards from said bottom wall or portion of the casing remaining locally substantially coaxial to a reference axis locally substantially perpendicular to the bottom wall or bottom portion of the casing.

[0024] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said vibration dumper additionally comprises at least one mechanic anchoring device which permanently rigidly fixes the lower end of said elastically-deformable oblong pad to the bottom wall or bottom portion of the casing.

[0025] Moreover according to the present invention there is provided a home laundry drier comprising an outer casing structured for resting on the floor and, inside the casing, a heat-pump assembly having a refrigerant compressing device which is connected to a bottom wall or bottom portion of said casing via one or more vibration dumpers structured for floatingly supporting the refrigerant compressing device at a given distance from said bottom wall or bottom portion; wherein the home laundry drier comprises a manually-removable anchoring screw

member which is located at least partly outside the casing and is structured so to selectively engage both the bottom wall or bottom portion of the casing and the outer housing of the refrigerant compressing device for substantially preventing the floating movement of the refrigerant compressing device.

[0026] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said manually-removable anchoring screw member is structured so to engage a corresponding pass-through hole or opening formed on the bottom wall or bottom portion of the casing for reaching the refrigerant compressing device, and to screw onto an outer housing of the refrigerant compressing device so to rigidly connect the refrigerant compressing device to the bottom wall or bottom portion of the casing.

[0027] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said manually-removable anchoring screw member is located beneath the refrigerant compressing device, and comprises a stem that protrudes into the casing through a pass-through hole or opening formed on the bottom wall or bottom portion of the casing, and extends towards the refrigerant compressing device up to reach and screw into a corresponding complementary screw portion present on an outer housing of the refrigerant compressing device; the manually-removable anchoring screw member furthermore comprising a head which is dimensioned to remain restrained outside the outer casing.

[0028] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said pass-through hole or opening is a pass-through opening which is shaped/ dimensioned so as to allow free entrance of the stem inside the outer casing.

[0029] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the stem of said anchoring screw member and the complementary screw portion on the outer housing of the refrigerant compressing device are dimensioned so as to pull and keep the outer housing of the refrigerant compressing device fixed to the bottom wall of the casing and/or in abutment on the bottom wall of the casing.

[0030] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the stem of said anchoring screw member and the complementary screw portion on the outer housing of the refrigerant compressing device are dimensioned so as to pull the outer housing of the refrigerant compressing device towards the bottom wall or bottom portion of the casing so as to deeply compress said one or more vibration dumpers thereby bringing close to zero the floating movement of the refrigerant compressing device.

[0031] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said pass-through hole or opening is an internally threaded pass-through hole, and the stem of the anchoring screw member is properly shaped/dimensioned to screw into both said internally threaded pass-through hole and into the complementary screw portion on the outer housing of the refrigerant compressing device.

[0032] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the outer casing of the laundry drier is provided with a lower base or socle structured for resting on the floor, and the manually-removable anchoring screw member is shaped/ dimensioned so as to jut out downwards beyond the lower base or socle of the casing so to prevent said casing from resting on the floor in a correct upright position.

[0033] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the outer housing of the refrigerant compressing device comprises a main casing and a number of supporting legs each sticking out from the bottom portion of the main casing, and the distal end of each supporting leg is anchored to the bottom wall or bottom portion of the casing via a corresponding vibration dumper.

[0034] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that the complementary screw portion is located on the bottom of the main casing of the refrigerant compressing device.

[0035] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that at least one of said one or more vibration dumpers comprises an elastically-deformable oblong pad that has the lower end rigidly fixed to the bottom wall or bottom portion of the casing, and extends upwards from said bottom wall or portion of the casing remaining locally substantially coaxial to a reference axis locally substantially perpendicular to the bottom wall or bottom portion of the casing.

[0036] Preferably, though not necessarily, the home laundry dryer is furthermore characterized in that said vibration dumper additionally comprises at least one mechanic anchoring device which permanently rigidly fixes the lower end of said elastically-deformable oblong pad to the bottom wall or bottom portion of the casing.

[0037] Preferably, the home laundry drier is furthermore characterized in that the refrigerant compressing device comprises a main casing structured for housing the refrigerant pumping assembly and the electric motor and a number of supporting legs each sticking out from the bottom portion of the main casing, at least one of the supporting legs is associated to the bottom wall or bottom portion of the casing via a corresponding vibration dumper.

[0038] Preferably, the home laundry drier is furthermore characterized in that the complementary screw portion is provided on the main casing of the refrigerant compressing device.

[0039] Preferably, the home laundry drier is furthermore characterized in that at least one of said one or more vibration dumpers comprises an elastically-deformable pad that has a lower end in contact to a bottom wall or bottom portion of the outer casing, and extends upwards from said bottom wall or portion of the casing, wherein an upper portion of the elastically-deformable

pad supports at least one of the supporting legs.

[0040] Preferably, the home laundry drier is furthermore characterized in that said vibration dumper additionally comprises at least one mechanic anchoring device which is arranged inside the elastically-deformable pad and fixed to the bottom wall or bottom portion of the casing, wherein the mechanic anchoring device is associated to at least one of the supporting legs.

[0041] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

- Figure 1 shows a schematic section view, with parts removed for clarity, of a rotary-drum home laundry drier realized in accordance with the teachings of the present invention;
- Figure 2 shows a partial enlarge view of the bottom portion of the Figure 1 home laundry drier, with parts in section and parts removed for clarity;
- Figure 3 shown a section view of one of the vibration dampers located on the bottom of the Figures 1 and 2 rotary-drum home laundry drier;
- Figure 4 shows working of the Figure 1 home laundry drier, with parts removed for clarity;
- Figure 5 shows an enlarge view of the bottom portion of a second embodiment of the Figure 1 home laundry drier; whereas
- Figure 6 shows working of an alternative version of the Figure 1 home laundry drier, with parts removed for clarity.

[0042] With reference to Figure 1, number 1 indicates as a whole a home laundry drier which comprises: a preferably, though not necessarily, parallelepiped-shaped outer boxlike casing 2 provided with a lower base or socle 2s structured for resting on the floor G; a substantially cylindrical, revolving drum 3 structured for housing the laundry to be dried, and which is fixed in axially rotating manner inside the boxlike casing 2, directly facing a laundry loading/unloading opening 2a formed in the front wall of casing 2; and a porthole door 4 hinged to the front wall of casing 2 to rotate about a preferably, though not necessarily, vertically-oriented reference axis, to and from a closing position in which the door 4 rests completely against the front wall of casing 2 to close opening 2a and substantially airtight seal the revolving drum 3.

[0043] Inside the boxlike casing 2, the home laundry dryer 1 additionally comprises an electric motor 5 which is mechanically connected to the revolving drum 3 for driving into rotation the drum 3 about its longitudinal axis; a closed-circuit, hot-air generator 6 which is structured to circulate through the revolving drum 3 a stream of hot air having a low moisture level, and which flows over and rapidly dries the laundry located inside drum 3; and finally an electronic central control unit 7 which controls both the electric motor 5 and the hot-air generator 6 to perform one of the user-selectable drying cycles preferably, though not necessarily, stored in the same central control unit 7.

[0044] In the example shown, in particular, the revolving drum 3 preferably extends inside the boxlike casing 2 coaxial to a substantially horizontally-oriented longitudinal reference axis L, and rests on a number of substantially horizontally-oriented, supporting rollers 8 which are located approximately at the two axial ends of the revolving drum 3, and are fitted to the casing 2 in free revolving manner so to let the revolving drum 3 freely rotate about its longitudinal axis L inside the casing 2.

[0045] With reference to Figure 1, the hot-air generator 6 is instead a heat-pump type, hot-air generator 6 which is structured for gradually drawing air from revolving drum 3; rapidly cooling down the air arriving from revolving drum 3 so to extract and retain the surplus moisture in the air drawn from revolving drum 3; rapidly heating the dehumidified air to a predetermined temperature, normally higher than the temperature of the air from revolving drum 3; and finally feeding the heated, dehumidified air back into the revolving drum 3, where it flows over the laundry inside the drum to rapidly dry said laundry.

[0046] In other words, the hot-air generator 6 provides for continually dehumidifying and heating the air circulating inside revolving drum 3 to rapidly dry the laundry inside the drum, and basically comprises:

- an air recirculating conduit 9 having its two ends in communication with, i.e. flowingly/ fluidically connected to, the revolving drum 3 on opposite sides of the latter;
- a centrifugal fan 10 which is located along the air recirculating conduit 9 to produce, inside the air recirculating conduit 9, an airflow f which flows through the revolving drum 3, over the laundry located inside the drum 3; and
- a heat-pump assembly 11 which is able to rapidly cool the airflow f coming out from revolving drum 3 for condensing and retaining the surplus moisture in the airflow f, and then to rapidly heat the airflow f returning back into revolving drum 3, so that the airflow f re-entering into revolving drum 3 is rapidly heated to a temperature higher than or equal to that of the airflow f coming out of the drum.

[0047] With reference to Figure 1, in the example shown, in particular, the inlet of the air recirculating conduit 9 is preferably integrated in the preferably substantially circular-shaped frame of boxlike casing 2 that defines/ delimits the laundry loading/unloading opening 2a. The porthole door 4, when arranged in the closing position, abuts on this peripheral frame so as to substantially airtight seal the laundry loading/unloading opening 2a and, at the same time, put the inlet of air recirculating conduit 9 in direct communication with the inside of revolving drum 3. The outlet of the air recirculating conduit 9, instead, is preferably aligned to the center of the rear rim of revolving drum 3, and is preferably realized/integrated in an inner bulkhead which is arranged inside cas-

ing 2 slightly spaced from the rear wall of casing 2.

[0048] Centrifugal fan 10, in turn, is preferably designed to produce an airflow f which flows, along recirculating conduit 9, from the intake of the air recirculating conduit 9, i.e. from the porthole door 4, to the outlet of the air recirculating conduit 9, i.e. to the opening integrated in the inner bulkhead of boxlike casing 2.

[0049] Preferably, the closed-circuit hot-air generator 6 is additionally provided with a manually-removable filtering assembly 12 which is located along the air recirculating conduit 9, upstream of the heat-pump assembly 11 and preferably also of centrifugal fan 10, and is structured to stop fluff and/or lint particles upstream of the aforesaid heat-pump assembly 11 and centrifugal fan 10.

[0050] With reference to Figure 1, the heat-pump assembly 11 in turn comprises:

- a first air/refrigerant heat exchanger 13 which is located along the air recirculating conduit 9 and is structured for rapidly cooling down the airflow f arriving from revolving drum 3 to condense and restrain the surplus moisture in the airflow f;
- a second air/refrigerant heat exchanger 14 which is located along the air recirculating conduit 9, downstream of heat exchanger 13, and which is structured for rapidly heating the airflow f arriving from heat exchanger 13 and directed back to revolving drum 3, so that the airflow f re-entering into revolving drum 3 is heated rapidly to a temperature higher than or equal to that of the air flowing out of revolving drum 3;
- an electrically-powered refrigerant compressing device 15 which is interposed between the refrigerant-outlet of heat exchanger 13 and the refrigerant-inlet of heat exchanger 14, and which is structured for compressing the gaseous-state refrigerant directed towards heat exchanger 14 so that refrigerant pressure and temperature are much higher at the refrigerant-inlet of heat exchanger 14 than at the refrigerant-outlet of heat exchanger 13; and
- an expansion valve or similar passive/operated refrigerant expansion device 16 (for example a capillary tube, a thermostatic valve or an electrically-controlled expansion valve) which is interposed between the refrigerant-outlet of heat exchanger 14 and the refrigerant-inlet of heat exchanger 13, and it is structured so as to cause a rapid expansion of the refrigerant directed towards the first air/refrigerant heat exchanger 13, so that refrigerant pressure and temperature are much higher at the refrigerant-outlet of heat exchanger 14 than at the refrigerant-inlet of heat exchanger 13.

[0051] Both air/refrigerant heat exchangers 13 and 14 are obviously located downstream of the filtering assembly 12 if present, and preferably also downstream of centrifugal fan 10.

[0052] The heat exchanger 13 is conventionally referred to as the "evaporator" or "gas-heater" of the heat-pump assembly 11, and it is structured so that the airflow f arriving from revolving drum 3 and the low-pressure and low-temperature refrigerant directed to the suction of the refrigerant compressing device 15 can flow through it simultaneously, allowing the refrigerant having a temperature lower than that of the airflow f, to absorb heat from the airflow f, thus causing condensation of the surplus moisture in the airflow f arriving from revolving drum 3.

[0053] The heat exchanger 14, instead, is conventionally referred to as the "condenser" or "gas-cooler" of the heat-pump assembly 11, and it is structured so that the airflow f directed back into revolving drum 3 and the high-pressure and high-temperature refrigerant arriving from the delivery of the refrigerant compressing device 15 can flow through it simultaneously, allowing the refrigerant having a temperature greater than that of the airflow f to release heat to the airflow f, thus rapidly heating the airflow f directed back into the revolving drum 3.

[0054] With reference to Figures 1 and 2, the refrigerant compressing device 15 of heat-pump assembly 11 is instead firmly anchored to a bottom wall or bottom portion 2b of the casing 2 via one or more vibration dumpers 17 which are structured for floatingly supporting the refrigerant compressing device 15 at a given distance from the inner bottom of the casing, so to prevent/minimize transmission to the boxlike casing 2 of the mechanical vibration generated by the refrigerant compressing device 15 when working.

[0055] In the example shown, in particular, the refrigerant compressing device 15 has an outer housing that comprises a main casing 18 preferably structured for housing both the refrigerant pumping assembly (not shown) and the electric motor (not shown) of the refrigerant compressing device 15, and a number of supporting legs 19 (four supporting legs in the example shown) that stick out from the bottom portion of the main casing 18 preferably evenly angularly spaced to one another; and the distal end of each supporting leg 19 is firmly anchored to the bottom wall 2b of the casing 2 via a corresponding vibration dumper 17 structured for dumping the mechanical vibration generated by the refrigerant compressing device 15 when working.

[0056] In the example shown, in particular, the outer housing of the refrigerant compressing device 15, i.e. main casing 18 and supporting legs 19, is preferably made of metal material.

[0057] With reference to Figures 2 and 3, each vibration dumper 17 instead extends coaxial to a corresponding reference axis A preferably locally substantially perpendicular to the bottom wall 2b of casing 2, and preferably comprises an elastically-deformable, oblong pad 20 that has its lower end 20b rigidly fixed to the bottom wall 2b of casing 2, and extends upwards from the bottom wall 2b of the casing 2 while remaining locally substantially coaxial to the reference axis A. The distal end of the supporting leg 19 is firmly fixed to the top end 20a of the elastically-deformable pad 20, at a given high/distance from the lower end 20b of the pad, so that the elas-

tically-deformable body of pad 20 can dump the mechanical vibrations traveling along the supporting leg 19 towards the bottom wall 2b of casing 2.

[0058] In the example shown, in particular, each vibration dumper 17 preferably comprises:

- a substantially cylindrical, cup-shaped body 20 which is made of a suitable elastomeric material, extends coaxial to reference axis A, and has its lower base 20b in abutment on the bottom wall 2b of casing 2;
- a central threaded stem 21 that sticks out from the bottom wall 2b of casing 2 while remaining locally substantially coaxial to the reference axis A, and engages in pass-through manner the lower base 20b of the cup-shaped body 20; and
- a locking nut 22 that is screwed on top of the threaded stem 21, immediately above the top end or rim 20a of cup-shaped body 20, for preventing the extraction/unthreading of the cup-shaped body 20.

[0059] As an alternative, the lower base 20b of the cup-shaped body 20 may be rigidly fixed/attach to the bottom wall 2b of casing 2 by means of a stud or rivet which extends in pass-through manner through the bottom wall 2b of casing 2 and through the lower base 20b of cup-shaped body 20 while remaining preferably locally substantially coaxial to reference axis A, and is permanently deformed onto both the bottom wall 2b of casing 2 and the lower base 20b of cup-shaped body 20, so to permanently rigidly fix/attach the lower base 20b of the cup-shaped body 20 to the bottom wall 2b of casing 2.

[0060] With reference to Figure 3, the distal end of the supporting leg 19 is instead provided with a preferably substantially circular, pass-through hole 19a which is locally substantially coaxial to reference axis A, and the top end or rim 20a of the cup-shaped body 20 is firmly and rigidly force fitted/mortised into the aforesaid pass-through hole 19a, immediately beneath the corresponding locking nut 22, so that the elastically deformable, upwards-projecting tubular wall of the cup-shaped body 20 can floatingly support the supporting leg 19 of the refrigerant compressing device 15 and dump the mechanical vibrations traveling along the supporting leg 19 towards the bottom wall 2b of the boxlike casing 2.

[0061] With reference to Figures 2 and 4, the home laundry dryer 1 is additionally provided with an outer manually-removable anchoring device 23 which is located outside of boxlike casing 2, beneath the refrigerant compressing device 15, and is structured for selectively engaging both the bottom wall or portion 2b of the casing 2 and the outer housing of the refrigerant compressing device 15 for preventing, or at least minimizing, the floating movement of the refrigerant compressing device 15 above the bottom wall or portion 2b of casing 2.

[0062] In other words, the manually-removable anchoring device 23 is at least partly located outside of casing 2 and it is structured so to engage a corresponding pass-through opening 24 formed on the bottom wall or bottom portion 2b of the appliance casing 2 for reaching the overhanging refrigerant compressing device 15. The manually-removable anchoring device 23 is furthermore structured so to rigidly engage onto the outer housing of the refrigerant compressing device 15 so to rigidly connect the refrigerant compressing device 15 to the bottom wall or bottom portion 2b of casing 2.

[0063] In the example shown, in particular, the manually-removable anchoring device 23 is preferably structured so to rigidly engage directly onto the main casing 18 of the refrigerant compressing device 15 so to rigidly connect the refrigerant compressing device 15 to the bottom wall or bottom portion 2b of casing 2.

[0064] In addition to the above, with reference to Figure 4, the end portion 23a of the anchoring device 23 that remains restrained outside the boxlike casing 2 is preferably shaped/dimensioned so as to jut out downwards beyond the lower base or socle 2s of the appliance casing 2 so as to prevent the lower base or socle 2s from evenly correctly resting on the floor G, thus preventing the boxlike casing 2, i.e. the whole laundry dryer 1, from resting on the floor G in a correct upright position that allows safe operation of the laundry dryer 1.

[0065] In other words, the end portion 23a of the anchoring device 23 that remains restrained outside the boxlike casing 2 is shaped/dimensioned so as to force the laundry dryer 1 to rest on the floor G in a tilted position, i.e. tilted with respect to the vertical.

[0066] With reference to Figure 1, the laundry dryer 1 is arranged in said correct upright position when the boxlike casing 2 rests on floor G balanced on the lower base or socle 2s and is oriented substantially vertical.

[0067] In particular, with reference to Figures 2 and 4, in the example shown the home laundry dryer 1 is preferably provided with a manually-removable anchoring screw 23 which is located immediately beneath the refrigerant compressing device 15, and is arranged so that the head 23a of the anchoring screw 23 remains outside the boxlike casing 2, and the straight threaded stem 23b of the anchoring screw 23 protrudes into the boxlike casing 2 through a corresponding pass-through opening 24 formed on the bottom wall 2b of casing 2, and extends towards the refrigerant compressing device 15 coaxial to a reference axis B preferably locally substantially perpendicular to the bottom wall 2b of casing 2, up to reach and screw into a corresponding female-screw portion 25 realized on the outer housing of refrigerant compressing device 15.

[0068] In the example shown, in particular, the female-screw portion 25 is preferably located at center of the bottom portion of the main casing 18 from which all supporting legs 19 protrude.

[0069] The pass-through opening 24 instead is preferably circular in shape and shaped/dimensioned so as to allow free entrance of the threaded stem 23b inside the boxlike casing 2, i.e. free axial movement of the stem 23b with respect to the bottom wall 2b of the casing. In

other words, the diameter of the pass-through opening 24 is larger that of the outer diameter of stem 23b.

[0070] The head 23a of the anchoring screw 23, in turn, is larger than the pass-through opening 24 on the bottom wall 2b of casing 2, so to be unable to cross the pass-through opening 24. In other words, the head 23a of the anchoring screw 23 is properly shaped/dimensioned so to remain restrained outside the boxlike casing 2.

[0071] With reference to Figure 4, the head 23a of the anchoring screw 23 is furthermore preferably shaped/dimensioned so as to jut out downwards beyond the lower base or socle 2s of the boxlike casing 2 for resting on the floor G together with the lower base or socle 2s, thus preventing at least part of lower base or socle 2s from abutting on the floor G and consequently preventing the boxlike casing 2, i.e. the whole laundry dryer 1, from resting on the floor G in the Figure 1 correct upright position.

[0072] In addition to the above, with reference to Figure 2, the threaded stem 23a of the anchoring screw 23 and the female-screw portion 25 on the main casing 18 are properly dimensioned so as to pull and keep, when substantially completely screwed into one another, the outer housing of the refrigerant compressing device 15 stably in abutment on the bottom wall 2b of casing 2, so to prevent any movement of the refrigerant compressing device 15 with respect to the bottom wall 2b of casing 2.

[0073] As an alternative, the threaded stem 23a of the anchoring screw 23 and the female-screw portion 25 on the main casing 18 are properly dimensioned so as to pull, when substantially completely screwed into one another, the refrigerant compressing device 15 towards the bottom wall 2b of casing 2 to deeply compress all elastically-deformable pads 20 against the bottom wall 2b of casing 2 up to bring close to zero the floating support to the refrigerant compressing device 15. When deeply compressed, in fact, vibration dumpers 17 became substantially rigid and therefore rigidly connect the supporting legs 19 of the refrigerant compressing device 15 to the bottom wall 2b of casing 2 .

[0074] General operation of home laundry drier 1 is clearly inferable from the above description, with no further explanation required.

[0075] As regards the anchoring screw 23, during the first installation of the laundry drier 1 the user is requested to tilt the appliance so as to reach the bottom of casing 2 and then to manually completely remove the anchoring screw 23 from the bottom of the boxlike casing 2, so to allow the vibration dumpers 17 to floatingly support the refrigerant compressing device 15.

[0076] The large-sized head 23a of the anchoring screw 23 prevents the lower base or socle 2s of the boxlike casing 2 to correctly rest on the floor, thus the user is facilitated/stimulated to tilt the appliance casing 2 and remove the anchoring screw 23 from the bottom of the boxlike casing 2.

[0077] The advantages connected to the presence of the anchoring screw 23 are remarkable.

[0078] First of all, the user can easily and quickly remove the anchoring screw 23 from the bottom of the appliance casing 2 with no risk to damaging any internal device.

[0079] Moreover the fact that the lower base or socle 2s of the boxlike casing 2 remains partially lifted from the floor (see figure 4) when the anchoring screw 23 is in place on the bottom of casing 2 greatly facilitates the user to inset the hand or any other suitable lifting tool beneath the boxlike casing 2 for tilting the laundry dryer 1.

[0080] Clearly, changes may be made to home laundry drier 1 as described herein without, however, departing from the scope of the present invention.

[0081] For example, the female-screw portion 25 located on main casing 18 of the refrigerant compressing device 15 may be replaced by a threaded protruding pin that sticks out from the bottom of the main casing 18 towards the bottom wall 2b, while remaining locally substantially coaxial to the reference axis B of the anchoring screw 23; whereas the stem 23b of the anchoring screw 23 is externally smooth and has on its distal end, i.e. on opposite side of head 23a, a central blind hole which is properly threaded and dimensioned so to screw onto the protruding pin that sticks out downward from main casing 18.

[0082] With reference to Figure 5, in an alternative embodiment the large pass-through opening 24 is replaced by an internally threaded pass-through circular hole 24', and the stem 23b of the anchoring screw 23 is properly shaped/dimensioned to screw into both the internally threaded pass-through hole 24' and into the female-screw portion 25 on the main casing 18 of the refrigerant compressing device 15.

[0083] When the stem 23b is screwed into both the threaded pass-through hole 24' and the female-screw portion 25 on the main casing 18 of refrigerant compressing device 15, the anchoring screw 23 rigidly connects the outer housing of the refrigerant compressing device 15 to the bottom wall 2b of casing 2, thus preventing any movement of the refrigerant compressing device 15 with respect to the bottom wall 2b of casing 2.

[0084] In this alternative embodiment, the anchoring screw 23 does not need to deeply compress the elastically-deformable pads 19 against the bottom wall 2b of casing 2 to prevent any movement of the refrigerant compressing device 15 with respect to the bottom wall 2b of casing 2.

[0085] In addition to the above, with reference to Figure 6, the lower base or socle 2s may consists of a number of ground-resting supporting feet 26 (in the example shown four supporting feet 26 located at the vertexes of a rectangle) that outwardly protrude from the bottom wall 2b of casing 2, and the end portion 23a of the anchoring device 23, i.e. the large-sized head 23a of the anchoring screw 23, is shaped/dimensioned so to be higher than at least one of these supporting feet 26.

Claims

1. Laundry drier (1) comprising an outer casing (2) provided with a lower base or socle (2s) structured for resting on the floor (G) and, inside the casing, a heat-pump assembly (11) having a refrigerant compressing device (15) which is connected to a bottom wall or bottom portion (2b) of said casing (2) via one or more vibration dumpers (17) structured for floatingly supporting the refrigerant compressing device (15); the home laundry drier (1) **being characterized by** also comprising manually-removable anchoring means (23) which are located at least partly outside the outer casing (2), and are structured for engaging the refrigerant compressing device (15) to substantially prevent the floating movement of the refrigerant compressing device (15); said anchoring means (23) having an end portion (23a) which is located outside the outer casing (2), and is shaped/ dimensioned so as to jut out downwards beyond the lower base or socle (2s) of the outer casing (2) so to prevent said casing (2) from resting on the floor (G) in a correct upright position.

2. Laundry drier according to Claim 1, **characterized in that** said manually-removable anchoring means (23) comprises: a head (23a) which is dimensioned to remain restrained outside the outer casing (2), and is shaped/dimensioned so as to jut out downwards beyond the lower base or socle (2s) of the casing (2) so to prevent said casing (2) from resting on the floor in said correct upright position; and a stem (23b) adapted to engage a corresponding complementary screw portion (25) provided on the refrigerant compressing device (15).

3. Laundry drier according to Claim 1 or 2, **characterized in that** said manually-removable anchoring means (23) comprises a manually-removable anchoring screw member (23) which is structured to engage a corresponding pass-through hole or opening (24, 24') formed on the bottom wall or bottom portion (2b) of the casing (2) and to engage the refrigerant compressing device (15) to rigidly connect the refrigerant compressing device (15) to the bottom wall or bottom portion (2b) of casing (2) and/or to pull the refrigerant compressing device (15) towards the bottom wall or bottom portion (2b) of the outer casing (2) so as to deeply compress said one or more vibration dumpers (17) thereby bringing close to zero the floating movement of refrigerant compressing device (15).

4. Laundry drier (1) comprising an outer casing (2) structured for resting on the floor and, inside the casing, a heat-pump assembly (11) having a refrigerant compressing device (15) which is connected to a bottom wall or bottom portion (2b) of said casing (2) via one or more vibration dumpers (17) structured for floatingly supporting the refrigerant compressing device (15); the home laundry drier (1) **being characterized by** also comprising a manually-removable anchoring screw member (23) which is located at least partly outside the casing (2) and is structured so to selectively engage both the bottom wall or bottom portion (2b) of the casing (2) and the outer housing (18, 19) of the refrigerant compressing device (15) for substantially preventing the floating movement of the refrigerant compressing device (15).

5. Laundry drier according to Claim 4, **characterized in that** said manually-removable anchoring screw member (23) is structured so to engage a corresponding pass-through hole or opening (24, 24') formed on the bottom wall or bottom portion (2b) of the casing (2) and to screw onto an outer housing (18, 19) of the refrigerant compressing device (15).

6. Laundry drier according to Claim 4 or 5, **characterized in that** said manually-removable anchoring screw member (23) comprises a stem (23b) that protrudes into the casing (2) through a pass-through hole or opening (24, 24') formed on the bottom wall or bottom portion (2b) of the casing (2), and extends towards the refrigerant compressing device (15) to engage a corresponding complementary screw portion (25) present on an outer housing (18, 19) of the refrigerant compressing device (15); the manually-removable anchoring screw member (23) furthermore comprising a head (23a) which is dimensioned to remain restrained outside the outer casing (2).

7. Laundry drier according to Claim 5 or 6, **characterized in that** said pass-through hole or opening (24, 24') is a pass-through opening (24) which is shaped/ dimensioned so as to allow free entrance of the stem (23b) inside the outer casing (2).

8. Laundry drier according to any one of Claims 4-7, **characterized in that** said anchoring screw member (23) and the complementary screw portion (25) on the outer housing (18, 19) of the refrigerant compressing device (15) are dimensioned so as to pull and keep the outer housing (18, 19) of the refrigerant compressing device (15) fixed to bottom wall (2b) of the casing (2) and/or in abutment on the bottom wall (2b) of the casing (2).

9. Laundry drier according to any one of Claims 4-7, **characterized in that** said anchoring screw member (23) and the complementary screw portion (25) on the outer housing (18, 19) of the refrigerant compressing device (15) are dimensioned so as to pull the outer housing (18, 19) of the refrigerant compressing device (15) towards the bottom wall or bottom portion (2b) of the casing (2) so as to deeply

compress said one or more vibration dumpers (17) thereby bringing close to zero the floating movement of the refrigerant compressing device (15).

10. Laundry drier according to Claim 5 or 6, **characterized in that** said pass-through hole or opening (24, 24') is an internally threaded pass-through hole (24'), and the stem (23b) of the anchoring screw member (23) is properly shaped/ dimensioned to screw into both said internally threaded pass-through hole (24') and into the complementary screw portion (25) on the outer housing (18, 19) of the refrigerant compressing device (15).

11. Laundry drier according to any one of Claims 4-10, **characterized in that** the outer casing (2) of the laundry drier (1) is provided with a lower base or socle (2s) structured for resting on the floor (G), and the manually-removable anchoring screw member (23) is shaped/dimensioned so as to jut out downwards beyond the lower base or socle (2s) of the casing (2) so to prevent said casing (2) from resting on the floor (G) in a correct upright position.

12. Laundry drier according to any one of Claims 1-11, **characterized in that** the refrigerant compressing device (15) comprises a main casing (18) structured for housing the refrigerant pumping assembly and the electric motor and a number of supporting legs (19) each sticking out from the bottom portion of the main casing (18), at least one of the supporting legs (19) is associated to the bottom wall or bottom portion (2b) of the casing (2) via a corresponding vibration dumper (17).

13. Laundry drier according to Claim 12, **characterized in that** the complementary screw portion (25) is provided on the main casing (18) of the refrigerant compressing device (15).

14. Home laundry drier according to any one of Claims 1-13, **characterized in that** at least one of said one or more vibration dumpers (17) comprises an elastically-deformable pad (20) that has a lower end (20b) in contact to a bottom wall or bottom portion (2b) of the outer casing (2), and extends upwards from said bottom wall or portion (2b) of the casing (2), wherein an upper portion of the elastically-deformable pad (20) supports at least one of the supporting legs (19).

15. Home laundry drier according to Claim 14, **characterized in that** said vibration dumper (17) additionally comprises at least one mechanic anchoring device (21, 22) which is arranged inside the elastically-deformable pad (20) and fixed to the bottom wall or bottom portion (2b) of the casing (2), wherein the mechanic anchoring device (21, 22) is associated to at least one of the supporting legs (19).

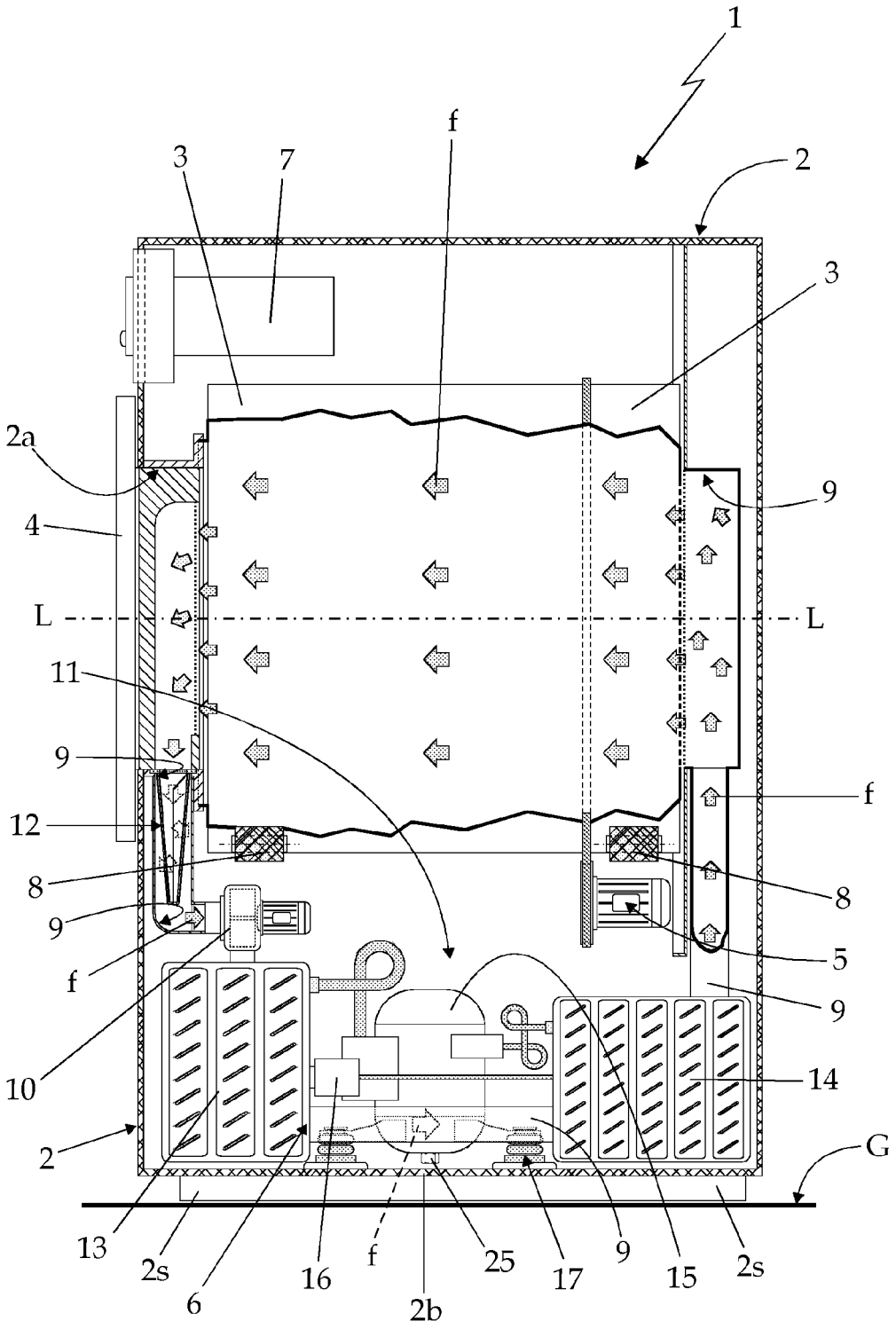
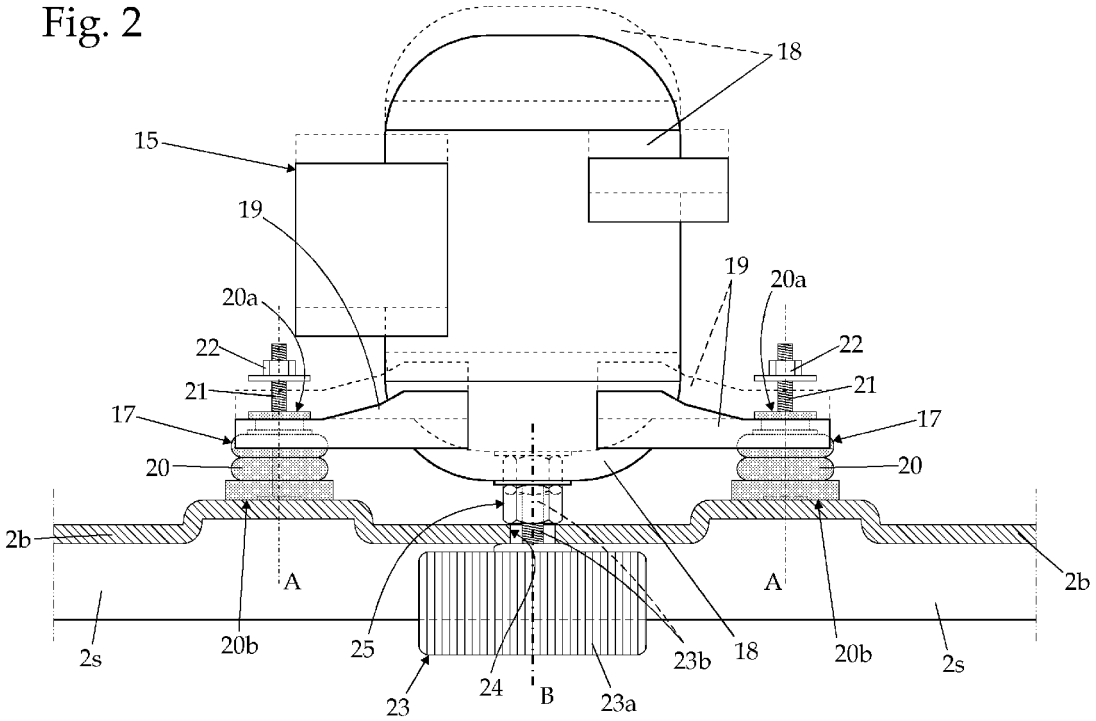


Fig. 1

Fig. 2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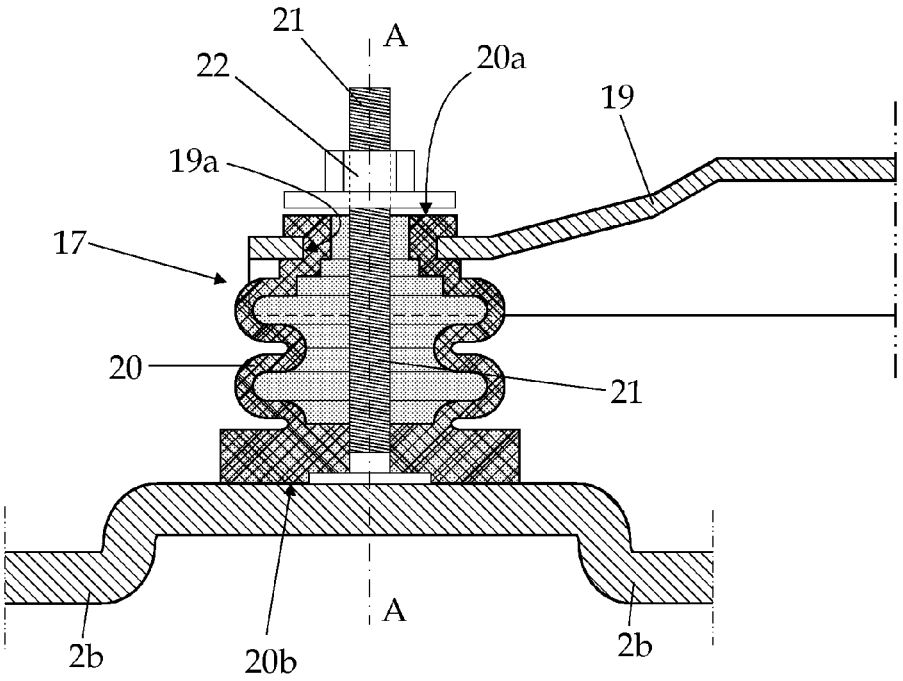
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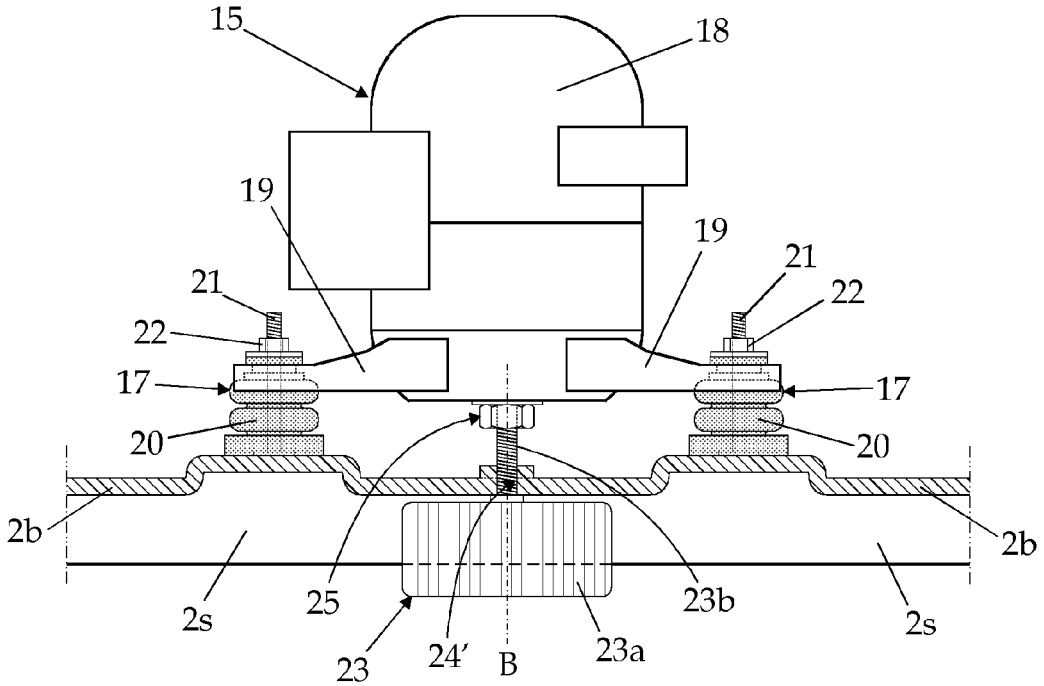
Fig. 3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24'
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23a

Fig. 5

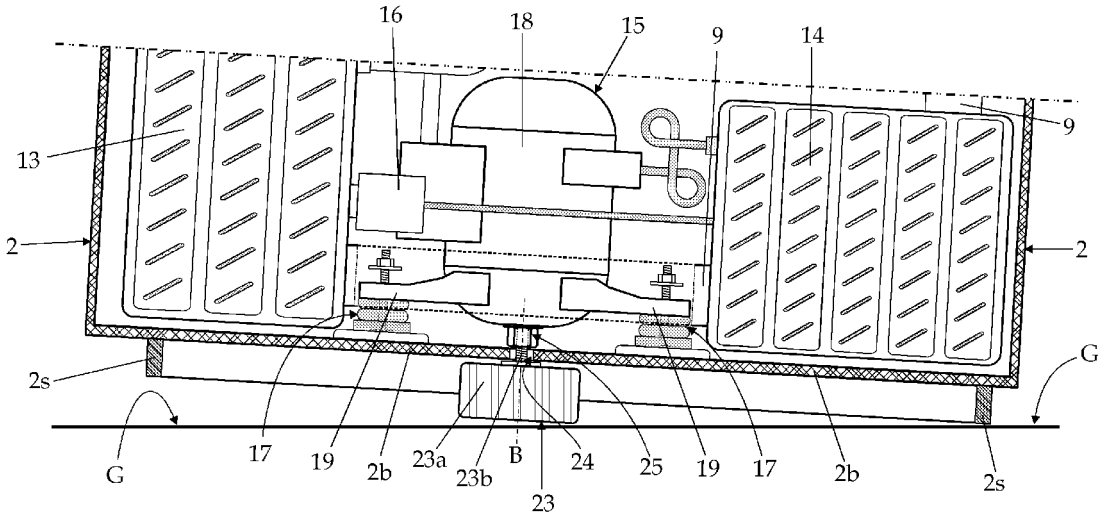

Fig. 4

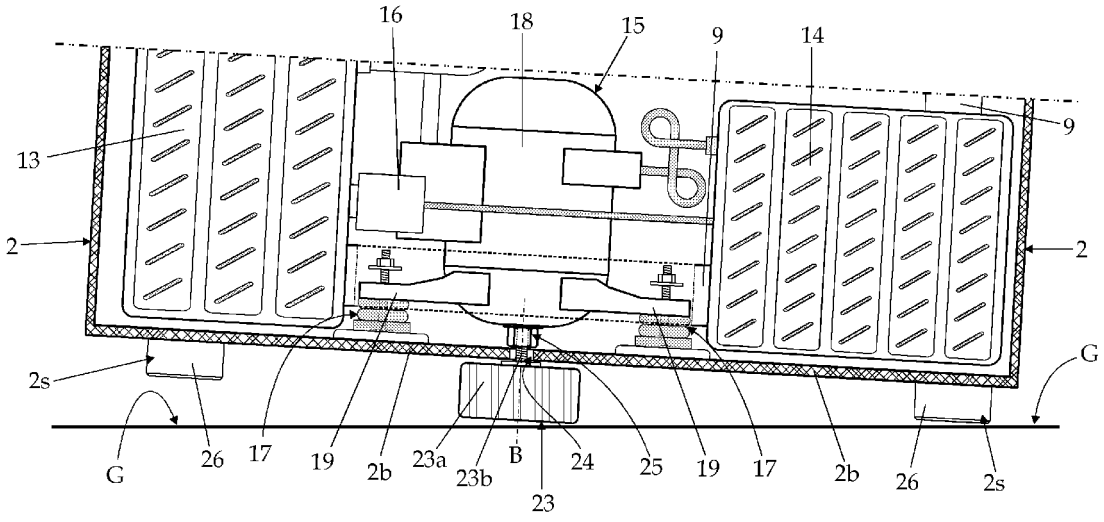

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 1783

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 January 2012	Hannam, Martin

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